Problematic connection between UHECRs and LLGRBs

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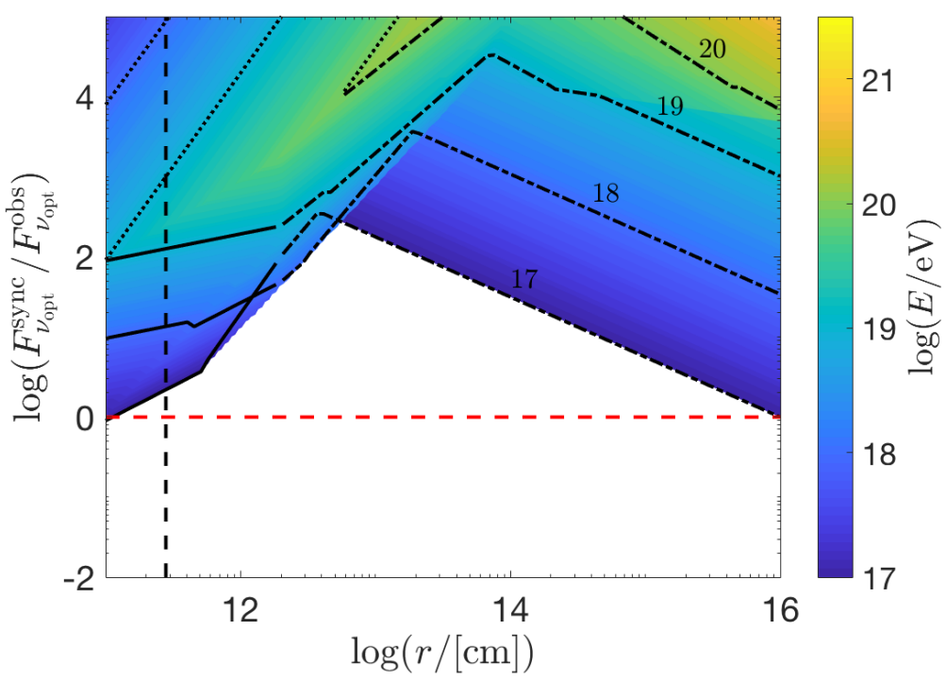
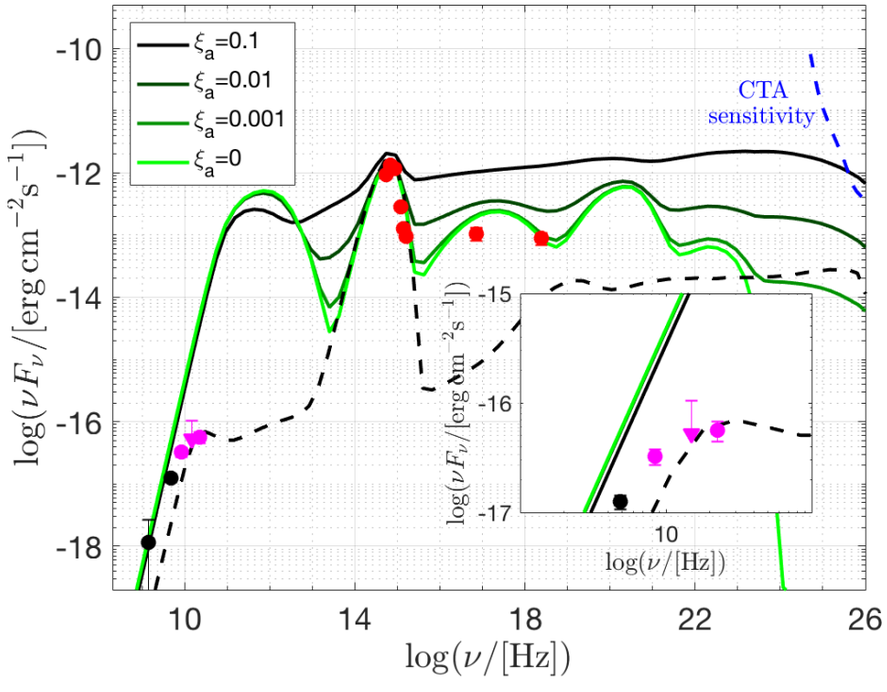
Samuelsson et al. (2019) ApJ, 876:93, Samuelsson et al. (2020) ApJ, 902:148

Idea: Use the synchrotron emission from the primary electrons as an additional messenger and compare the emission with observations of GRB 060218.

Results prompt phase:
The high magnetic field required for UHECR acceleration lead to immense optical emission from the electrons



Results afterglow phase:
The high energy budget required for observed UHECR flux lead to immense radio emission from the electrons



Conclusions: Emission from electrons is a powerful additional tool in UHECR multi-messenger studies. Mildly relativistic outflows of LLGRBs unlikely to be the main sources of UHECRs.